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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

A Roll Stand for Use in a Stretcher-Leveller Machine

We, VSESOJUZNY NAUCHNO-ISSLEDOVATELSKY I PROEKTNOKONSTRUKTORSKY INSTITUT METALLURGICHESKOGO MASHINOSTROENIA, of 10, I Gorodskaya Ulitsa, Moscow, Union of Soviet Socialist Republics, a body coporate organised and existing under the laws of the Union of Soviet Socialist Republics, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to working metal and more specifically to roll stands for use with sheet-stretcher or stretcher-leveller machines. Generally, the present device is particularly useful for attaining uniform thickness of high-strength sheet-steel rolled stock.

Devices for attaining uniform thickness of sheet steel are now in use in the art. Such devices include two clamping heads, wherein the ends of a sheet being stretched are held by such heads. A multi-roll stand with idle rolls is adapted to travel between the clamping heads by means of a carriage.

Such a device, however, is incapable of use for attaining uniform thickness of high-strength sheet steel. To make is possible to effect stretching of such sheets in the device, it would be necessary to employ rollers of substantially higher weight and size, which, in turn would lead to a correspondingly increased size of the stand and, therefore cause an increased length of the end portions of the sheet which are not of the uniform thickness. Moreover, the yield of such devices is substantially reduced due to inconvenience of engaging the sheet in the stand and fastening its ends in clamping heads.

An object of the present invention is to eliminate the disadvantages mentioned above.

It is a specific object of the present invention to provide a roll stand suitable for use in a stretcher-leveller machine, said stand being capable of levelling high-strength sheet-steel rolled stock and featuring lower weight, greater compactness of its construction, higher production capacity, and greater convenience in engaging the sheet as compared to the roll stands of the prior art and reducing the length of the sheet which is not rolled to uniform thickness.

The invention consists in a roll stand for use in a stretcher-leveller machine which machine includes a pair of spaced apart clamping heads arranged for relative movement to stretch a sheet of metal, the roll stand being arranged for travel along the sheet of metal in order to make its thickness uniform, characterized in that the roll stand includes at least one elastic chamber adapted to be fed with fluid under pressure, and a roll supported on back-up rollers which in turn are operatively connected to the elastic chamber to vary the pressure exerted by the roll on the sheet of metal.

The roll may comprise least three sections, the length of the middle one being of such a size to accomodate the sheet being levelled.

The elastic chamber may be formed with compartments or sections and each of its sections or compartments communicates with a particular source of fluid so as to provide differential pressures between the compartments or sections.

The invention will now be described with reference to the accompanying drawings, wherein:

Fig. 1 is a schematic drawing of a stretcher-leveller machine including a roll stand according to the present invention taken in a fragmentary sectional view;

Fig. 2 is a partially cut away section on the line II—II of Fig. 1; and

Fig. 3 is a isometric projection of the lower roll of the roll stand showing the backup or support rollers and slide blocks.

A roll stand 1 is incorporated in a stretcher-leveller machine in Fig. 1. Located on both sides of the roll stand 1 are clamping heads 2 and 3 secured on a bed 4. To effect traversing of the roll stand 1 there is provided a motor 5 with a speed-reduction unit 6, couplings 7, 8 and a brake 9 which is intended to damp forces of inertia arising after the motor 5 has been switched off. The coupling 8 connects the shaft of the speed-reduction unit 6 to a drive shaft 10 to take the torque therefrom by a sliding spline (not shown in the drawing). The bevel pinion 11, in turn, imparts rotation to a bevel gear-wheel 12 set in place on a shaft 13 (Fig. 2) together with gear-wheels 14 and 15. The gear-wheels 14 and 15 are adapted to mesh with toothed racks 16 and 17 respectively to effect translational motion of the roll stand along guideways 18 and 19 supported by uprights 20, 21 which in turn, are mounted on the bed 4 of the machine.

The housing of the roll stand 1 is composed of two halves, a fixed bottom half 23, and swing-out top half 24, and these halves are interconnected by a hinge joint 22. The top half 24 of the stand housing is locked to the bottom half 24 by means of a bayonet lock 25 provided with a handle 26. A counterweight 27 mounted on a bracket 28 is provided to balance the top half 24 of the stand housing.

Further, in the present device the bottom half 23 of the stand housing is provided with a compartmented rubber chamber 29 whose compartments communicate with sources of fluid fed at different predetermined pressures. Located above the chamber is a spacer 30 on which slide blocks 31 of backup rollers 32 (Fig. 3) are supported. The rollers are disposed on axles 33. The external surface of the outer races of conventional ball bearings are employed as said backup rollers.

Resting upon the backup rollers 32 is the bottom roll which is formed with a middle section 34 and two end sections 35. The length of the middle section is selected to suit the width of the sheet 36 being rolled. The end sections 35 bear up against a top roll 37 to prevent possible deflection or bending of the sheet metal being rolled.

The top half 24 of the stand housing includes respective backup rollers 38 with slide blocks 39 and a spacer 40 similar to the afore-described ones. To keep the rolls and the rollers in their proper positions in each of the stand halves a laminated-fabric plate 41 is fixed to each of the slide blocks. The swing-out top half of the stand housing is provided with a retainer screw 42 (Fig. 1) to hold the slide blocks in place when the top half is swung out for feeding the sheet 36 into the stand or stripping it therefrom.

The roll stand of a stretcher-leveller machine disclosed herein operates as follows:

In order to set the sheet 36 into place in the roll stand 1, the handle 26 of the bayonet lock 25 is rotated to swing the top half of the stand housing upwardly with the respect to the bottom half, whereupon the sheet of high-strength steel is set into place in the stand. The ends of the sheet are then placed into the opened clamping heads 2 and 3 and are clamped therein, whereafter the clamping head 3 is moved away from the clamping head 2 by a hydraulic cylinder (not shown in the drawing). As a result the sheet is tensioned.

Thereupon the top half of the stand housing is pivoted down onto the sheet, and the handle 26 of the bayonet lock is then turned to its closed position. Next, fluid is pressure-fed to the compartments of the rubber chamber 29 which causes the middle section 34 of the bottom sectional roll to press upon the sheet 36 being rolled.

Then the pressure in the hydraulic cylinder which actuates the clamping head 3, is increased to stress the sheet to its tensile yield point. Then the motor 5 effecting translational motion of the roll stand 1, is actuated to move the stand from the clamping head 2 towards the clamping head 3 along the guideways 18 and 19 in order to make the thickness of the sheet uniform. The pressure in the corresponding compartments of the chamber which press the roll sections against the sheet being made uniform, can be varied in order to componsate for defects in particular portions of the sheet surface.

Once the sheet-levelling procedure has been completed, the hydraulic cylinder in the clamping head 3 and the rubber chamber 29 are de-pressurized. Then the bayonet lock is released by rotating the handle 26, the stand is then opened and the sheet ends are released from the clamping heads 2 and 3 and the sheet removed from the machine. The whole operation can be later repeated.

The chamber 29 may be fabricated of an elastic material and may be compartmented or non-compartmented. The latter being the case, the entire chamber communicates with a single source of pressurized fluid.

The chamber may be provided in the top and/or bottom halves of the housing of the roll stand.

The clamping head 2 need not be fixed as herein above described. For example the clamping head 3 may be fixed in place and

the clamping head 2 movable or both clamping heads can be movable.

WHAT WE CLAIM IS:—

1. A roll stand, for use in a stretcher-leveller machine which machine includes a pair of spaced apart clamping heads arranged for relative movement to stretch a sheet of metal, the roll stand being arranged for travel along the sheet of metal in order to make its thickness uniform, chracterized in that the roll stand includes at least one elastic chamber adapted to be fed with fluid under-pressure, and a roll supported on back-up rollers which in turn are operatively connected to the elastic chamber to vary the pressure exerted by the roll on the sheet of metal.

2. A roll stand as claimed in Claim 1, wherein the back-up rollers are fixed in slide blocks.

3. A roll stand as claimed in Claims 1 or 2 wherein the roll includes a middle section and two end sections arranged so that only the middle section is in rolling contact with the sheet of metal.

4. A roll stand as claimed in any of one of the above claims, wherein the roll stand includes two halves one of which is pivotally mounted on the other.

5. A roll stand as claimed in Claim 4, wherein one half of the roll stand has a single roll and a plurality of back-up rollers and the other half of the roll stand includes three rolls a plurality of back-up rollers and an elastic chamber.

6. A roll stand as claimed in any of the above Claims, wherein the pressurized chamber is divided into a plurality of compartments, so that a different pressure force may be exerted by each compartment.

7. A roll stand substantially as herein described with reference to the accompanying drawings.

8. A stretcher-leveller machine of the type including a pair of spaced apart clamping heads adapted for relative movement to stretch a sheet of metal, and a roll stand arranged for travel along sheet of metal in order to make its thickness uniform, characterized in that the roll stand includes at least one elastic chamber adapted to be fed with fluid under pressure, a roll supported on back-up rollers which in turn are operatively connected to the elastic chamber to vary the pressure exerted by the roll on the sheet of metal.

9. A stretcher-leveller machine substantially herein-described above with reference to the accompanying drawings.

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2 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

SHEET 1

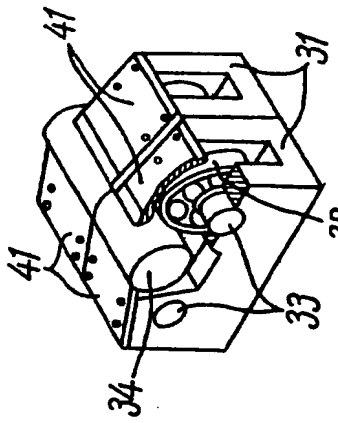

FIG. 3

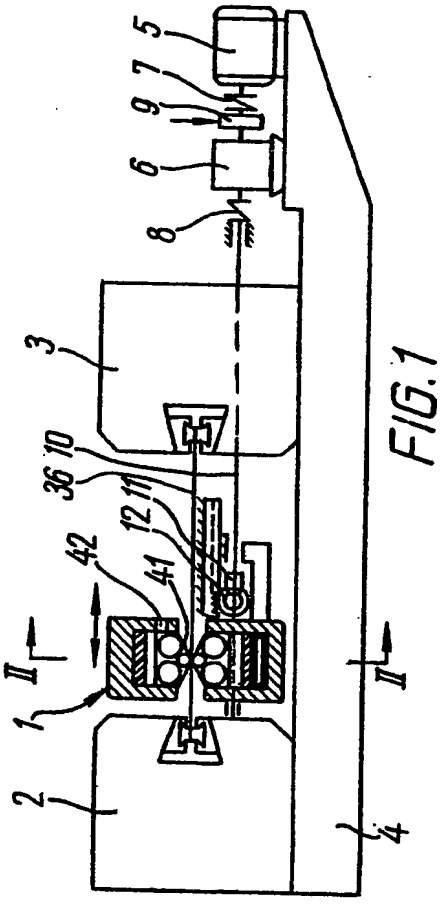

FIG. 1

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SHEET 2

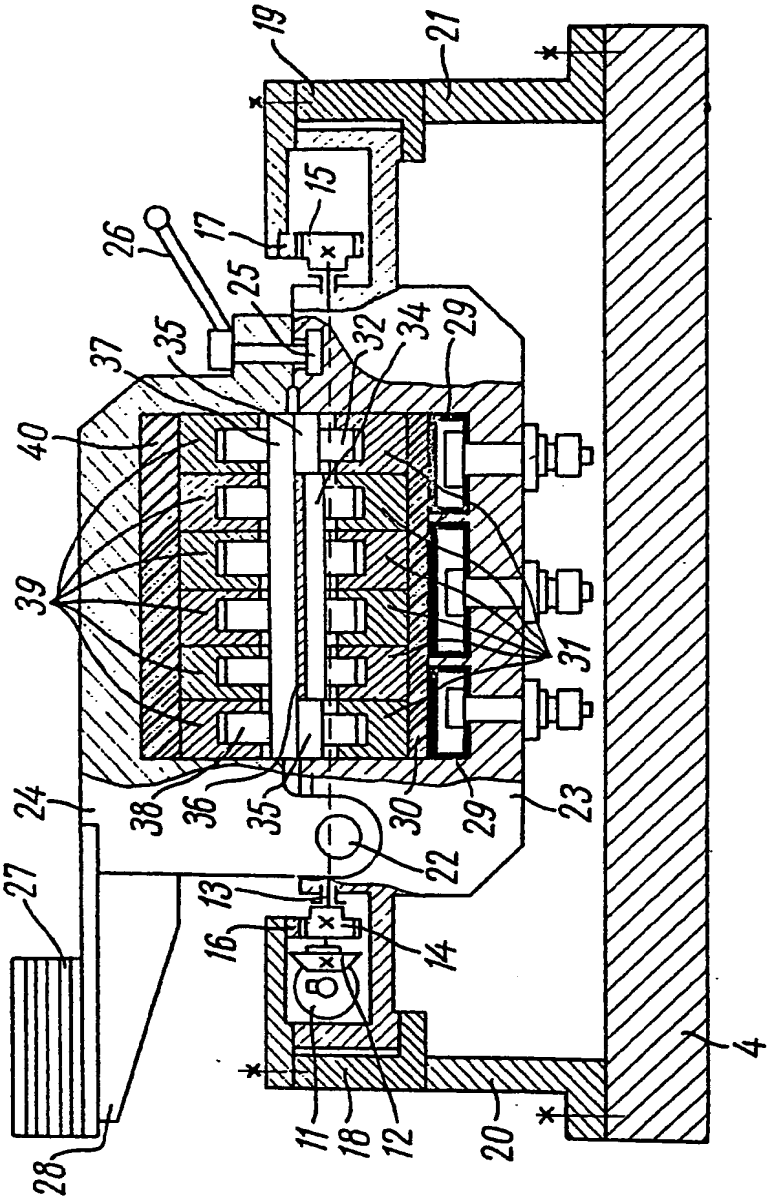

FIG. 2